

Appendix 1: Summary of advice in the NICE guideline on type 2 diabetes management

Summary of medicines for further treatment

NICE National Institute for Health and Care Excellence

Medicine	Options and BNF link	Form	Contraindications or special warnings (see SPCs)	Effect on weight	Hypoglycaemia risk	Renal impairment	Hepatic impairment
DPP-4 inhibitor ('gliptins')	Alogliptin Linagliptin Saxagliptin Sitagliptin Vildagliptin	Tablet	Ketoacidosis	None	Low	Dose reduction or caution (not for linagliptin)	Caution or avoid (not for linagliptin and sitagliptin)
GLP-1	Dulaglutide Exenatide Liraglutide Lixisenatide Semaglutide	Tablet or injection	Ketoacidosis Severe gastro-intestinal disease (not for liraglutide and semaglutide) Liraglutide: diabetic gastroparesis, inflammatory bowel disease	Loss	Low	Dose reduction or caution or avoid Check the BNF monographs for eGFR thresholds	Caution or avoid (not for dulaglutide, exenatide, and lixisenatide) Check the BNF monographs for severity
Insulin	Insulin treatment summary See BNF monographs	Injection	See individual SPCs	Gain	High	Dose reduction	Dose reduction
Pioglitazone	Pioglitazone	Tablet	History of heart failure, previous or active bladder cancer, uninvestigated macroscopic haematuria	Gain	Low	No warnings	Avoid
SGLT2 inhibitor ('flozins')	Canagliflozin Dapagliflozin Empagliflozin Ertugliflozin	Tablet	Ketoacidosis	Loss	Low	Dose reduction or caution or avoid. Check the BNF monographs for eGFR thresholds	Caution or avoid Check the BNF monographs for severity
Sulfonylurea	Gliclazide Glimepiride Glipizide Tolbutamide	Tablet	All sulfonylureas: ketoacidosis Gliclazide and tolbutamide: avoid where possible in acute porphyrias	Gain	Moderate High in older people	Dose reduction or caution or avoid. Check the BNF monographs for eGFR thresholds	Caution or avoid Check the BNF monographs for severity

When exercising their judgement, professionals and practitioners are expected to take this guideline fully into account, alongside the individual needs, preferences and values of their patients or the people using their service. It is not mandatory to apply the recommendations, and the guideline does not override the responsibility to make decisions appropriate to the circumstances of the individual, in consultation with them and their families and carers or guardian.

This information is a summary of the recommendations, please consult the guideline for the full recommendations. All supplementary information is taken from the BNF or the SPCs.

In February 2022, using ertugliflozin to reduce cardiovascular risk when blood glucose is well controlled was off label. See [NICE's information on prescribing medicines](#).

See [summaries of product characteristics \(SPCs\)](#), [British national formulary \(BNF\)](#) or the [Medicines and Healthcare products Regulatory Agency \(MHRA\)](#) for up-to-date information.

Published date: February 2022. Last updated: August 2022. This is a summary of the advice in the [NICE guideline on type 2 diabetes in adults: management](#).

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Metformin	Metformin	Acute metabolic acidosis	None	Low	Dose reduction or avoid. Check the BNF monograph for eGFR thresholds	Withdraw if tissue hypoxia likely
Pioglitazone	Pioglitazone	Ketoacidosis, history of heart failure, previous or active bladder cancer, uninvestigated macroscopic haematuria	Gain	Low	No warnings	Avoid
SGLT2 inhibitor ('flozins')	Canagliflozin Dapagliflozin Empagliflozin Ertugliflozin	Ketoacidosis	Loss	Low	Dose reduction or caution or avoid. Check the BNF monographs for eGFR thresholds	Caution or avoid. Check the BNF monographs for severity
Sulfonylurea	Gliclazide Glimepiride Glipizide Tolbutamide	All sulfonylureas: ketoacidosis Gliclazide and tolbutamide: avoid where possible in acute porphyrias	Gain	Moderate High in older people	Dose reduction or caution or avoid. Check the BNF monographs for eGFR thresholds	Caution or avoid. Check the BNF monographs for severity

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Appendix 2: Diabetes UK Information Prescription: Diabetes and Kidney Disease

Name:
Name of Doctor/Nurse:

Date:



Diabetes – Keeping your kidneys healthy Information prescription

Your last two blood test results (eGFR) are: / / / /

Your last two urine test results (ACR) are: / / / /

A third of people with diabetes go on to develop kidney problems. Blood and urine tests can show the first signs of any damage and help you to keep your kidneys healthy.

What do my kidneys do?



Your kidneys are filters that remove harmful waste from your body in to your urine and keep the things you need, like proteins.

What happens when your kidneys are damaged?

High blood glucose (sugar) levels over many years can damage the small blood vessels in the kidneys and clog the filters. The first sign of damage is protein leaking into your urine. If spotted early it can be repaired, so the tests to check your kidneys should be done once a year. The two tests are:

- a blood test for eGFR (how well your kidneys are filtering)
- a urine test for ACR (how much protein is leaking).

In the early stages of kidney disease there may be no symptoms. Having high blood pressure causes further damage, which along with kidney disease, increases your risk of having a heart attack or stroke. With more advanced kidney disease you may feel unwell, tired or nauseous and your hands and feet may look swollen.

How can I keep my kidneys healthy?

In the next column are some really important things that you can do to keep your kidneys healthy.

Blood pressure

- Keep your blood pressure at a healthy level. You may need medication to do this.

HbA1c

- High blood glucose levels increase the chance of kidney damage. Discuss with your healthcare team an appropriate target to reduce them.

Stop smoking

- For help giving up ask for your local stop smoking service.

Cholesterol

- Lowering bad cholesterol is important to keep you healthy. You may need a statin to do this.

Eat a healthy balanced diet

- Reduce salt: eat less fast food, choose low-salt options, and do not add salt.
- If you drink, cut down on alcohol.
- Aim for at least five portions of vegetables and fruit a day.
- Eat less fatty foods, processed meats, full-fat dairy and sugary foods.
- Aim for at least two portions of oily fish a week.

Get more active

- Aim for 30 minutes five times a week to raise your heartbeat. Activities like walking fast and cycling all count. Add some activity that strengthens your muscles, like gardening or yoga, twice a week.

Agreed action plan

My personal goal is:

To be achieved when:

The two steps that I will take to achieve this are:

(Discuss and agree with your doctor or nurse. Think about what, where, when and how?)

- 1
- 2

For information or support, call Diabetes UK Helpline: 0345 123 2399* Monday to Friday, 9am–6pm, or go to www.diabetes.org.uk/info-kidneys

*Calls may be recorded for quality and training purposes.

This PDF can be accessed at Diabetes UK Information Prescription - Healthy kidneys

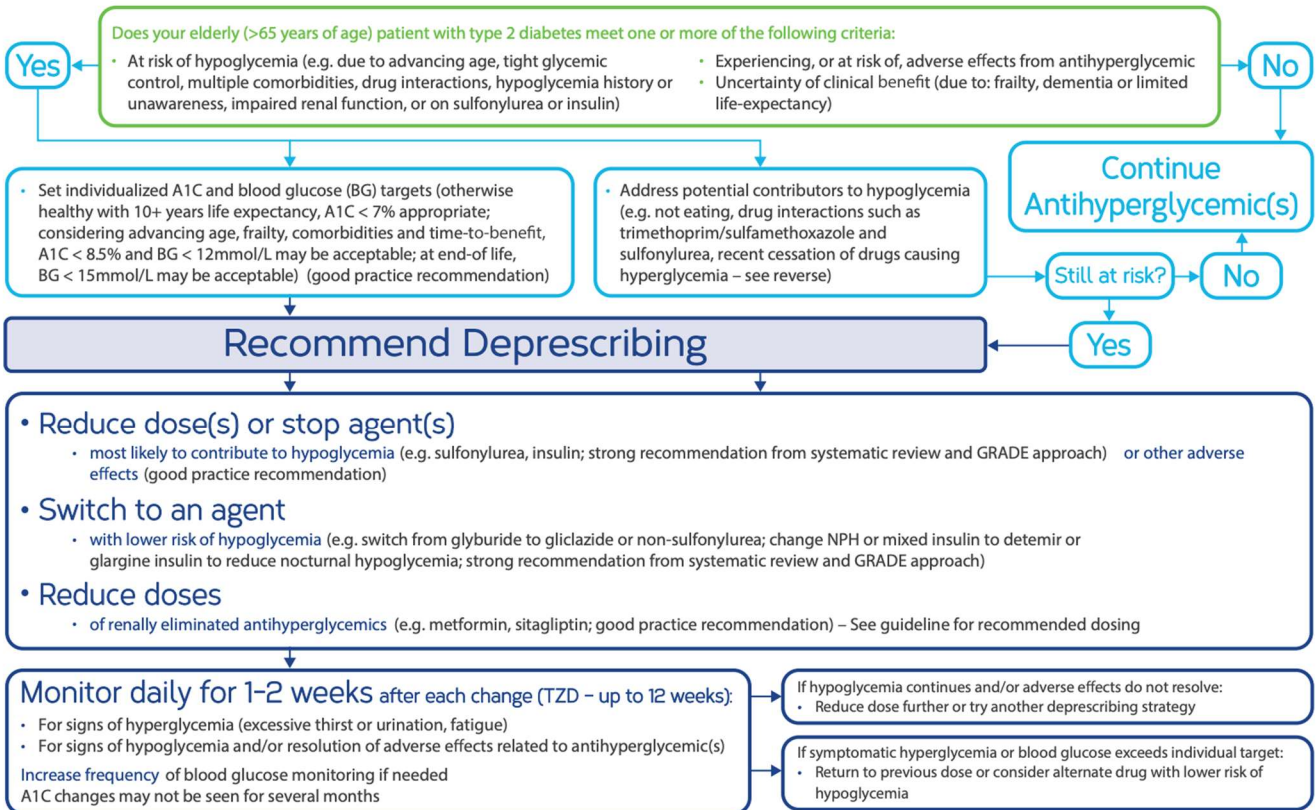
Source: <https://www.diabetes.org.uk/>

Appendix 3: Antihyperglycaemics Deprescribing Algorithm (deprescribing.org)



Antihyperglycemics Deprescribing Algorithm

August 2018



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 Contact deprescribing@bruyere.org or visit deprescribing.org for more information.

Farrell B, Black C, Thompson W, McCarthy L, Rojas-Fernandez C, Lochman H, et al. Deprescribing antihyperglycemic agents in older persons. Evidence-based clinical practice guideline. Can Fam Physician 2017;63:832-43 (Eng), e452-65 (Fr).



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 Canadian Institutes of Health Research
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Antihyperglycemics and Hypoglycemia Risk

Drug	Causes hypoglycemia?
Alpha-glucosidase inhibitor	No
Dipeptidyl peptidase-4 (DPP-4) inhibitors	No
Glucagon-like peptide-1 (GLP-1) agonists	No
Insulin	Yes (highest risk with regular insulin and NPH insulin)
Meglitinides	Yes (low risk)
Metformin	No
Sodium-glucose linked transporter 2 (SGLT2) inhibitors	No
Sulfonylureas	Yes (highest risk with glyburide and lower risk with gliclazide)
Thiazolidinediones (TZDs)	No

Drugs affecting glycemic control

- Drugs reported to cause hyperglycemia (when these drugs stopped, can result in hypoglycemia from antihyperglycemic drugs) e.g. quinolones (especially gatifloxacin), beta-blockers (except carvedilol), thiazides, atypical antipsychotics (especially olanzapine and clozapine), corticosteroids, calcineurin inhibitors (such as cyclosporine, sirolimus, tacrolimus), protease inhibitors
- Drugs that interact with antihyperglycemics (e.g. trimethoprim/sulfamethoxazole with sulfonylureas)
- Drugs reported to cause hypoglycemia (e.g. alcohol, MAOIs, salicylates, quinolones, quinine, beta-blockers, ACEIs, pentamidine)

Engaging patients and caregivers

- Some older adults prefer less intensive therapy, especially if burdensome or increases risk of hypoglycemia
- Patients and/or caregivers may be more likely to engage in discussion about changing targets or considering deprescribing if they understand the rationale:
 - Risks of hypoglycemia and other side effects
 - Risks of tight glucose control (no benefit and possible harm with A1C < 6%)
 - Time to benefit of tight glucose control
 - Reduced certainty about benefit of treatment with frailty, dementia or at end-of-life
- Goals of care: avoid hyperglycemic symptoms (thirst, dehydration, frequency, falls, fatigue, renal insufficiency) and prevent complications (5-10 years of treatment needed)
- Many countries agree on less aggressive treatment of diabetes in older persons
- Reviewing options for deprescribing, as well as the planned process for monitoring and thresholds for returning to previous doses will help engage patients and caregivers

Hypoglycemia information for patients and caregivers

- Older frail adults are at higher risk of hypoglycemia
- There is a greater risk of hypoglycemia with tight control
- Symptoms of hypoglycemia include: sweating, tachycardia, tremor BUT older patients may not typically have these
- Cognitive or physical impairments may limit older patient's ability to respond to hypoglycemia symptoms
- Some drugs can mask the symptoms of hypoglycemia (e.g. beta blockers)
- Harms of hypoglycemia may be severe and include: impaired cognitive and physical function, falls and fractures, seizures, emergency room visits and hospitalizations

Tapering advice

- Set blood glucose & A1C targets, plus thresholds for returning to previous dose, restarting a drug or maintaining a dose
- Develop tapering plan with patient/caregiver (no evidence for one best tapering approach; can stop oral antihyperglycemics, switch drugs, or lower doses gradually e.g. changes every 1-4 weeks, to the minimum dose available prior to discontinuation, or simply deplete patient's supply)
- Doses may be increased or medication restarted any time if blood glucose persists above individual target (12-15 mmol/L) or symptomatic hyperglycemia returns

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Farrell B, Black C, Thompson W, McCarthy L, Rojas-Fernandez C, Lochnan H, et al. Deprescribing antihyperglycemic



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Type 2 diabetes: agreeing my blood glucose (HbA1c) target

Patient decision aid



What is the best blood glucose (HbA1c) target for me?

If you have type 2 diabetes you may have higher levels of glucose (sugar) in your blood. Your blood glucose levels are usually measured by an HbA1c blood test. Your HbA1c level shows your average blood glucose over the past 2 to 3 months.

You can help to manage your blood glucose levels with diet and changes to your lifestyle, such as keeping a healthy weight. But people with type 2 diabetes will also usually need to take medicines to manage their blood glucose.

NICE recommends that you and your diabetes team should agree a target HbA1c that you will aim for with their support. We've written this decision aid to help you work out together what that target should be for you at the moment.

When you are agreeing the target, it's important to think about what else is happening in your life and what matters most to you.

You can use the diagram on the last page to help you think about how important some things are compared with others. There might be other things you want to talk to your diabetes team about as well. **It is important that you make a decision that you feel is right for you.**

Every so often it's a good idea to think about whether this is still the best target for you. This could be at your annual review, or sooner if you wish.

Many people with type 2 diabetes find their HbA1c increases over time, even with treatment. That's why treatments may need to be changed as part of your ongoing care.



Blood glucose and long-term health

In the long term, people who have a higher HbA1c are at higher risk of having problems with their blood vessels and heart. These might include angina, a heart attack or a stroke. They also have an increased risk of conditions affecting the eyes and vision, the feet, nerves and kidneys. All of these could lead to complications that could seriously harm the person's quality of life.

But not everyone gets these problems, and there is a lot you can do to reduce your risk. As well as managing your

blood glucose levels, these include:

- stopping smoking (if you smoke)
- keeping a healthy weight
- staying active

and for some people:

- managing your blood pressure (usually with medicines)
- taking a statin or other medicine to manage your cholesterol.

Your diabetes team can explain more about these and how you can get help with them. NICE has produced other decision aids about managing blood pressure and taking a statin.



What are the possible benefits from managing my blood glucose?

High blood glucose levels can cause symptoms such as feeling thirsty, needing to pass urine a lot and feeling more tired than usual. Managing your blood glucose can stop these things from happening and improve how you feel day-to-day.

For reducing the risk of long-term health problems, the evidence is unclear about how much extra benefit comes from aiming for a lower target HbA1c compared with aiming for a slightly

more relaxed target. Discuss with your diabetes team how much benefit you might expect, thinking about your age, how long you have had diabetes and whether you already have some of the health problems that can come with it.

Diabetes specialists agree that managing your blood glucose will reduce the risk of health problems in the long term. However, it's not possible to say for sure what will happen to any individual person.



What are the possible challenges in managing my blood glucose?

Aiming for a lower blood glucose target may mean you have to take more medicines. Taking more medicines may also mean you are more likely to get side effects. But not everyone will get side effects and they may not trouble you if they do happen. It is usually possible to change your medicines to ones that suit you better.

There might be times when your blood glucose level goes too low – this is called hypoglycaemia (or 'hypo' for short). Most hypos are mild and do not

cause much trouble, but some can cause people to feel dizzy or faint, and they might need help from someone else to treat the hypo. There are special rules for some drivers who have diabetes – talk to your diabetes team to see if they affect you.

For some people, aiming for a low target HbA1c may make them more likely to get hypos, and some people find it hard to recognise when they are getting a hypo. Some medicines are more likely to cause hypos than others.



Your target HbA1c: weighing it up

Make a mark on each of the lines to show how you feel about these statements. The more you agree with the statement on the left, the further to the left you should put your mark. The more you agree with the statement on the right, the further to the right you should put your mark. You and your diabetes team can use this to help decide the best target HbA1c for you.

Having hypos would not be a problem for me	_____	Having hypos would be a big problem for me
I'm not concerned about possible side effects from diabetes medicines	_____	I'm very concerned about possible side effects from diabetes medicines
I'm willing to take more medicines if I need to	_____	I do not want to take any more medicines
I do not have any health issues apart from my diabetes	_____	I have lots of health issues as well as my diabetes
Thinking about my age and my health overall, my quality of life in the long term is important to me	_____	Thinking about my age and my health overall, my quality of life in the shorter term is more important to me





What are Antihyperglycemics?

Antihyperglycemics are drugs that are used to reduce blood sugar levels to treat diabetes. There are many different types of antihyperglycemic drugs:

- Insulin
- Acarbose (e.g. Glucobay[®])
- Metformin (e.g. Glucophage[®])
- Alogliptin (Nesina[®]), linagliptin (Trajenta[®]), sitagliptin (Januvia[®]), saxagliptin (Onglyza[®])
- Dulaglutide (Trulicity[®]), exenatide (e.g. Byetta[®], liraglutide (Victoza[®]))
- Gliclazide (e.g. Diamicon[®]), glimepiride (Amaryl[®]), glyburide (Diabeta[®]), tolbutamide
- Repaglinide (Gluconorm[®])
- Canagliflozin (Invokana[®]), dapagliflozin (Forxiga[®]), empagliflozin (Jardiance[®])
- Pioglitazone (Actos[®]), rosiglitazone (Avandia[®])
- Products are available that combine 2 different drugs in 1 pill

Why use less of, stop, or change Antihyperglycemics?

When antihyperglycemic drugs are first given, the goal is to keep blood sugar levels within a certain range to prevent problems like heart attacks, strokes or nerve damage. It can take several years of treatment to reduce risk of these problems.

With age, benefits are less clear and the risk of hypoglycemia (low blood sugar) gets higher. Very low blood sugar targets (tight control) may not be needed and can be risky. Older people may also need lower doses to avoid other side effects that can happen with low kidney function.

The risk of low blood sugar is higher for people who:

- Are older and frail, or who have dementia
- Have many medical conditions or low kidney function
- Have tight blood sugar control
- Have a history of low blood sugars or do not have symptoms when their blood sugars are low
- Are taking insulin or sulfonylurea type drugs like glyburide
- Are taking medications that can interact with antihyperglycemics, or cause low blood sugar, or mask symptoms of low blood sugar

Low blood sugar can increase risk for falls, fractures, confusion, seizures and hospitalizations.

Stopping, reducing or changing an Antihyperglycemic is not for everyone

If you are not at risk for low blood sugar, you are not having any side effects and you and your prescriber feel there is clear benefit to taking the medications, then, you do not need to make any changes.

Healthy older people may choose to stick with an A1C target less than 7% and blood sugar goals similar to their younger days in order to reduce the risk of complications.

But, people over 65 who might be at risk of low blood sugar or want to revisit their diabetes treatment goals **should talk to their health care provider** about whether deprescribing is the right choice for them.

How to safely reduce an Antihyperglycemic

First, work with your health care provider to choose appropriate blood sugar and A1C targets for your age and state of health. For example, blood sugars less than 12mmol/L and A1C less than 8.5% may be appropriate for an older, frailer person with many other medical conditions.

Together, develop a plan for medication changes. This might involve reducing a dose, changing to a safer medication or stopping a medication altogether. Such changes could occur every 1 to 2 weeks, always under the supervision of your health care provider.

Many healthcare providers can be involved in helping to decide on the best approach to changing your antihyperglycemic medications. These include doctors, nurses, pharmacists, certified diabetes educators or dieticians. They can advise on how to safely reduce doses, change medications, stop medications or make lifestyle changes that can help meet the new targets and reduce risk of low blood sugar.

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What to monitor while making changes to an Antihyperglycemic

Develop a plan with your health care provider for monitoring. For example, you could check your blood sugar daily for 1-2 weeks after each change. You may need a longer time for monitoring depending on the type of medication you are taking (up to 12 weeks for some).

- Watch for signs of high blood sugar (e.g. increase in thirst, urination or fatigue).
- Watch for improvement in low blood sugar (with fewer symptoms such as sweating, fast heart rate or tremor)
- Watch for improvement in other side effects.
- Report changes to your health care provider
- Changes in the A1c blood test may not be seen for several months.

What to do if low blood sugars or drug side effects continue?

Talk to your health care provider. They can help decide what changes to make next. They may suggest eating at regular times (to reduce risk of low blood sugar). They may check your other medications to make sure none are interacting with your antihyperglycemics or causing low blood sugar on their own. They may also check to see if you recently stopped a medication that can cause high blood sugar.

What to do if blood sugars go above your individualized target?

If blood sugar readings or A1c go above the agreed upon target, your healthcare provider may decide to return to the previous dose or consider changing to a different drug with less risk of low blood sugar.

Personalized Antihyperglycemic dose reduction strategy

Blood glucose target: _____

A1c target: _____

Deprescribing strategy and monitoring plan:

This pamphlet accompanies a deprescribing guideline and algorithm that can be used by doctors, nurse practitioners, or pharmacists to guide deprescribing.



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